

We claim:

1. In a communication system having a sending station and a receiving station, the sending station for sending a communication signal upon a communication channel, to the receiving station, the communication channel susceptible to fading, an improvement of closed loop power control apparatus for selectively controlling power levels of the communication signal, said power control apparatus comprising:

10 a determiner coupled to receive indications of the communication signal, once transmitted upon the communication channel and received at the receiving station, the determiner for determining, at least when fading exhibited by the communication channel upon which the communication signal is sent causes fading of the communication signal beyond a selected threshold; and

15 a power controller coupled to receive indications of determinations made by said determiner, said power controller for selectively providing power control change indications to the sending station, the power control change indications of levels not to cause an increase in power levels of the communication signal if the determiner determines the fading of the communication signal to be beyond the selected threshold.

2. The power control apparatus of claim 1 wherein said determiner is coupled to receive indications of both a signal strength of the communication signal and noise levels of noise, said determiner for determining a signal-to-noise ratio and, responsive to a value of the signal-to-noise ratio less than a selected value, for determining the fading exhibited by the communication channel to be beyond the selected threshold.

3. The power control apparatus of claim 1 wherein said determiner is further for determining, subsequent to determining when the fading

5 exhibited by the communication channel is beyond the selected threshold, when the fading exhibited by the communication channel returns to be within the selected threshold, said determiner for determining the fading to be within the selected threshold responsive to the value of signal-to-noise ration returning to be greater than the selected value.

4. The power control apparatus of claim 3 wherein said power controller further provides power control change indications to the sending station to permit an increase in power levels of the communication signal when the fading exhibited by the communication channel returns to be within the selected threshold.

5 5. The power control apparatus of claim 1 wherein said determiner is coupled to receive indications of power control change indications previously provided by said power controller to the sending station, said determiner for determining the fading exhibited by the communication channel to be beyond the selected threshold when a selected number of successive power control change indications previously provided by said power controller request increase in the power levels of the communication signal.

6. The power control apparatus of claim 5 wherein said determiner is further for determining, subsequent to determining when the fading exhibited by the communication channel is beyond the selected threshold, when the fading exhibited by the communication channel returns to be within the selected threshold.

7. The power control apparatus of claim 6 wherein said power controller further provides power control change indications to the sending station to permit an increase in power levels of the communication signal when the fading exhibited by the communication channel returns to be within the selected threshold.

667 263 239 263 667

SUBMET

SUBMET

8. The power control apparatus of claim 1 wherein a pilot signal is further broadcast by the sending station to the receiving station and wherein said determiner is coupled to receive indications of both a signal strength of the pilot signal and an average value of the signal strength of the pilot signal, 5 said determiner for comparing the indications of the signal strength of the pilot signal with the indications of the average value to form a comparison therebetween, said determiner for determining the fading exhibited by the communication channel to be beyond the selected threshold when the comparison is less than a selected level.

9. The power control apparatus of claim 1 wherein a pilot signal is further broadcast by the sending station to the receiving station and wherein said determiner is coupled to receive indications of a derivative of signal strength of the pilot signal, said determiner for determining the fading 5 exhibited by the communication channel when the derivative is at least a selected negative value.

10. The power control apparatus of claim 1 wherein said power controller further provides at least one power control change indication to the sending station to cause a decrease in the power levels of the communication signal if the determiner determines the fading of the communication signal to be beyond the selected threshold.

11. The power control apparatus of claim 10 wherein said power controller provides a selected plurality of power control change indications to the sending station to cause the decrease in the power levels of the communication signal by a selected magnitude of power level decrease.

12. The power control apparatus of claim 11 wherein, subsequent to providing the selected plurality of power control change indications to the sending station, said power control provides subsequent power control change indications to the sending station to maintain the decrease in the power levels

5 of the communication signal to be of the selected magnitude of power level decrease.

13. The power control apparatus of claim 1 wherein the communication system comprises of CDMA (code division multiple access) cellular communication system, wherein the sending station comprises a base station of network infrastructure of the cellular communication system,
5 wherein the receiving station comprises a mobile station and wherein at least a portion of said determiner is located at the mobile station.

14. The power control apparatus of claim 13 wherein at least a portion of said power controller is located at the mobile station.

15. The power control apparatus of claim 13 wherein the communication channel comprises a forward-link traffic channel and wherein said determiner determines whether the forward link traffic channel exhibits a deep fade condition.

16. A closed-loop power control method for selectively controlling power levels of a communication signal sent by a sending station upon a communication channel to a receiving station, the communication channel susceptible to fading, said method comprising:

determining, responsive to indications of the communication signal once transmitted upon the communication channel and received at the receiving station, at least when fading exhibited by the communication channel upon which the communication signal is sent causes fading of the communication signal beyond a selected threshold; and

10 selectively providing power control change indications to the sending station responsive to determinations made during said operation of determining, the power control indications of levels not to cause an increase in power levels of the communication signal only if the fading of the communication signal determined during said operation of determining is
15 determined to be beyond the selected threshold

Sub 87

SUB 87

SUB 18 7
17. The method of claim 16 wherein said operation of selectively providing power control change indications to the sending station are of levels to cause a decrease in the power levels of the communication signal.

18. The method of claim 16 comprising the additional operations of:
subsequently determining when fading exhibited by the communication channel no longer causes fading of the communication signal beyond the selected threshold; and

re-enabling normal power control change indications to the sending station.

SUB 27 5
19. The method of claim 16 wherein the sending station comprises a base station of a cellular communication system and the receiving station comprises a mobile station and wherein said operations of determining and selectively providing are performed at the mobile station.